



## Forest Health Protection Pacific Southwest Region

Date: February 18, 2014

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To: Forest Supervisors (Eldorado, Inyo, Lassen, Modoc, Plumas, Sierra, Stanislaus, Sequoia and Tahoe National Forests and the Lake Tahoe Basin Management Unit), Park Superintendents (Sequoia Kings Canyon and Yosemite National Parks), Field Managers (Bureau of Land Management, Eagle Lake and Alturas Field Offices), and Deputy Director (CAL FIRE Resource Management)

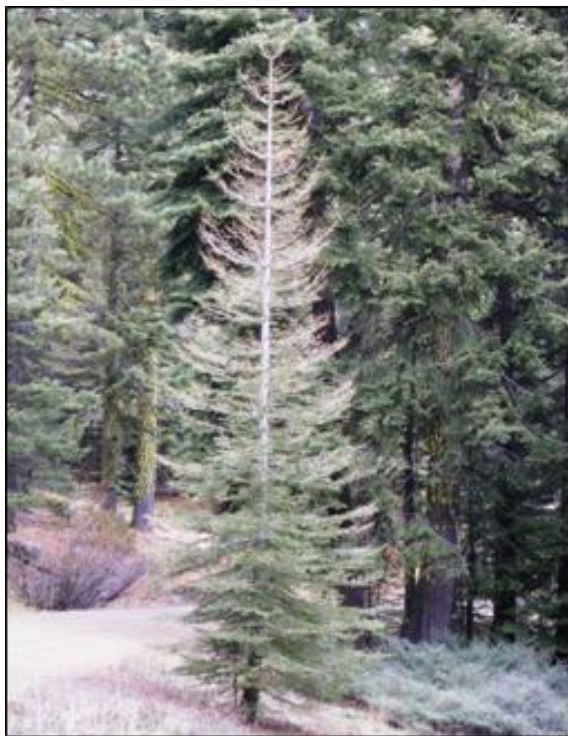
Subject: Douglas-fir Tussock Moth Outbreak Status and Results of 2013 Pheromone Detection Survey (FHP Report NE14-01)

Enclosed are the results of the 2013 cooperative Douglas-fir tussock moth (DFTM) pheromone detection survey (Table 1). Participation in this effort includes the US Forest Service, CAL FIRE, Bureau of Land Management and the National Park Service.

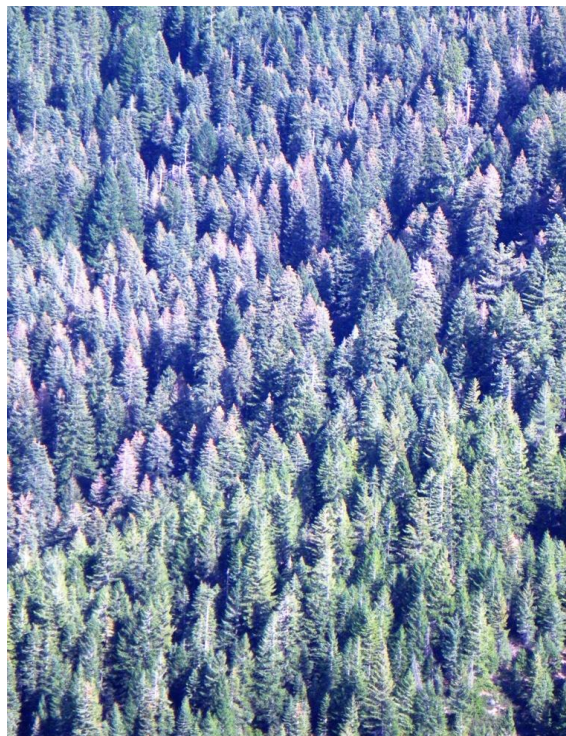
### **Douglas-fir tussock moth outbreaks were observed in northeastern California in 2013 and could intensify and develop in new locations in 2014**

- Light to moderate defoliation of white fir was observed on ~6,000 acres on the Plumas and Lassen National Forests and adjacent private timberland (Figures 1 & 2).
- DFTM adult trap counts were very high in some locations with 39 plots indicating the potential for more defoliation in the coming year. Most high count plots were in northeastern California (Map 1 & Table 1).
- Fall egg mass surveys indicated some previously infested areas on the Plumas National Forest and adjacent private timberland may experience severe defoliation in 2014. Some white fir mortality may occur on these sites.
- There is a high potential for new areas of defoliation in 2014 on the Tahoe and Lassen National Forests and adjacent private timberlands.
- Land managers should be aware that DFTM outbreaks in recreation areas may be a public health concern as hairs from caterpillars and cocoons can cause allergic reactions in some people (Appendix A)
- Treatment options exist to control DFTM populations or to protect high-value sites and trees (Appendix A).
- Forest Health Protection and CAL FIRE Pest Management staffs are available to provide assistance to land managers affected by current and new outbreak areas (Appendix B).





**Figure 1.** White fir defoliated by Douglas-fir tussock moth, Plumas National Forest



**Figure 2.** Tops of white fir defoliated by Douglas-fir tussock moth. Plumas National Forest

Traps were installed in 177 plots this year with 84% reporting. 27% of plots averaged  $> 25$  male moths per trap. A  $> 25$  male per trap average is considered high and follow up egg mass and/or larval density surveys are conducted on these plots to determine the potential for defoliation in the coming year. The thirty-nine high count plots in 2013 were located on the Tahoe NF (12 plots), Lassen NF (11 plots), Modoc NF (3 plots), Stanislaus NF (2 plots), Sequoia NF (2 plots), Eldorado NF (1 plot), Sierra NF (1 plot), and 7 plots on private timberland (monitored by CAL FIRE) (Map 1). Forest Health Protection and CAL FIRE personnel have already conducted egg mass surveys at select locations and will conduct larval surveys in late spring/early summer for the remaining plots.

The results of the 2013 trap monitoring reveal several areas that have the potential for DFTM-caused defoliation in 2014. Forest Health Protection and/or CAL FIRE Pest Management staff will conduct additional monitoring if any defoliation is detected this summer, with affected acres being reported to the appropriate land managers. Field going personnel are urged to continue to check for evidence of feeding and defoliation on white fir this coming summer and fall and report any findings to your local forest health contacts (Appendix B).

Sufficient trapping materials have been ordered for the detection survey plots for 2014 and will be distributed to cooperators in June or July. Updates on population monitoring will be distributed to land managers as needed.

Forest Health Protection appreciates the continued cooperation from all agencies in this ongoing west-wide survey effort and especially thanks the following DFTM Detection Survey cooperators:

Don Owen, CAL FIRE, Redding  
Tom Smith, CAL FIRE, Davis  
Jim Kral, CAL FIRE, Mountain Home DSF  
David Shy, CAL FIRE, Tulare  
Frank Spandler, CALFIRE Tulare  
Tom Warner, NPS, Sequoia Kings Canyon  
Brian Mattos, NPS, Yosemite  
Cliff Motheral, BLM, Susanville  
Peter Hall, BLM, Alturas  
Ryan Tompkins, Plumas NF  
Cathy Carlock, Modoc NF  
Barbara Bryan, Modoc NF  
Sandy Tiffin, Lassen NF  
Matt Cerney, Lassen NF  
Paul White, Lassen NF  
Gary Cline, Tahoe NF  
Kelly Hack, Tahoe NF  
Jerald Griffin, Tahoe NF

James Ingram, Eldorado NF  
Jeff Griffin, Eldorado NF  
Bob Carroll, Eldorado NF  
Dana Walsh, Eldorado NF  
Laura Cheney, Eldorado NF  
Jim Junette, Stanislaus NF  
Eileen Carlen, Stanislaus NF  
Kathy Stillwell, Stanislaus NF  
David Vosti, Stanislaus NF  
Maria Benech, Stanislaus NF  
Francey Blaugrund, Sierra NF  
Dave Smith, Sierra NF  
George Powell, Sequoia NF  
John Springer, Sequoia NF  
Andrew Weinhart, Inyo NF  
Scott Kusumoto, Inyo NF  
Rita Mustatia, LTBMU

If you have any questions regarding this report and/or need additional site specific information please contact Danny Cluck at 530-252-6431.

*/s/ Danny Cluck*

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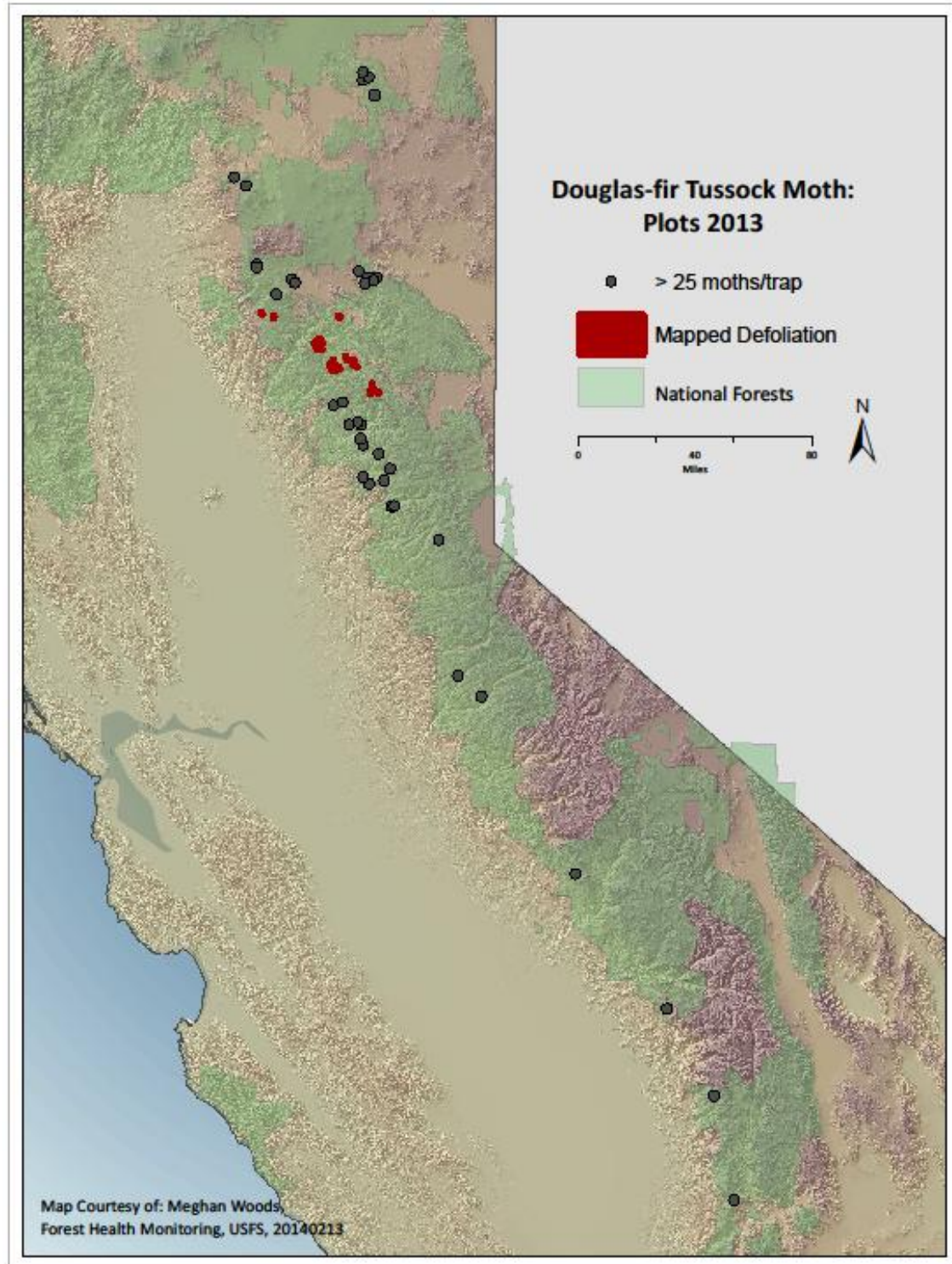
cc: Forest Health Protection, Regional Office  
Beverly Bulaon, Stanislaus NF

**Table 1.** Number of Douglas-fir tussock moth pheromone detection survey plots by trap catch for 1997 - 2013 for California.

Year	# of plots reported/ % reported	NUMBER OF PLOTS WITH AN AVERAGE MOTH CATCH PER TRAP OF:														
		0<10	10<20	20<25		25<30	30<35	35<40	40<45	45<50	50<55	55<60	60<65	65<70	70<75	75+
1997	142	88	27	10		9	4	3	0	0	1	0	0	0	0	0
	100%	62%	19%	7%		6%	3%	2%			<1%					
1998	159	81	22	11		9	6	3	10	7	5	2	1	1	1	0
	100%	51%	14%	7%		6%	3%	2%	6%	4%	3%	<1%	<1%	<1%	<1%	
1999	159	126	20	5		3	2	2	0	0	0	1	0	0	0	0
	100%	79%	13%	3%		2%	1%	1%				1%				
2000	185	154	15	4		4	0	1	2	2	2	0	0	1	0	0
	100%	83%	8%	2%		2%		<1%	1%	1%	1%			<1%		
2001	183	95	57	13		10	6	0	1	1	0	0	0	0	0	0
	100%	52%	31%	7%		5%	3%		<1%	<1%						
2002	168	126	31	5		3	3	0	0	0	0	0	0	0	0	0
	100%	75%	18%	3%		2%	2%									
2003	163	53	42	11		11	10	14	13	3	1	4	0	1	0	0
	100%	32%	26%	7%		7%	6%	8%	8%	2%	1%	2%		1%		
2004	174	68	43	6		16	11	6	5	3	0	2	1	1	0	0
	* 93%	39%	25%	3%		9%	6%	3%	3%	2%		1%	<1%	<1%		
2005	195	139	15	11		7	4	3	2	3	1	0	0	0	1	1
	*95%	71%	8%	5%		4%	2%	2%	1%	2%	<1%				<1%	<1%
2006	164	98	26	8		8	5	3	4	3	4	2	0	1	1	1
	100%	60%	16%	5%		5%	3%	2%	2%	2%	2%	2%		<1%	<1%	<1%
2007	164	157	6	0		0	1	0	0	0	0	0	0	0	0	0
	100%	96%	4%				<1%									
2008	155	155	0	0		0	0	0	0	0	0	0	0	0	0	0
	100%	100%														
2009	147	144	3	0		0	0	0	0	0	0	0	0	0	0	0
	*93%	98%	2%													
2010	142	134	6	2		0	0	0	0	0	0	0	0	0	0	0
	*90%	95%	4%	1%												
2011	146	100	23	5		7	5	2	2	1	2	1	0	0	0	0
	*90%	68%	16%	3%		5%	3%	1%	1%	<1%	1%	<1%				
2012	133	76	18	5		7	4	7	3	4	4	4	1	1	0	0
	*82%	57%	14%	4%		5%	3%	5%	2%	3%	3%	3%	<1%	<1%		
2013	147	85	16	7		6	5	4	6	5	2	4	1	2	1	3
	*84%	58%	11%	5%		4%	3%	3%	4%	3%	1%	3%	<1%	1%	<1%	2%

\*some traps not counted due to weather or plots were burned in recent fires





**Map 1.** The 2013 Douglas-fir tussock moth plots with elevated trap catches (gray dots) and DFTM-caused defoliation mapped on the Plumas National Forest (red polygons).

## **Appendix A: Douglas-fir Tussock Moth Biology and Management**

The Douglas-fir tussock moth (DFTM), *Orgyia pseudotsugata*, is an important native defoliator of white fir in California and outbreaks of DFTM have occurred somewhere in the state about every 10 years. These outbreaks occur abruptly but generally subside within one to two years. During outbreaks, white fir is the primary affected host but defoliation may also be observed in other tree species. Defoliation by DFTM may kill or top-kill many trees or weaken trees making them more susceptible to attacks by bark beetles. Growth may be reduced for several years after significant defoliation.

Usually the first indication of attack appears in late spring. Larvae from the newly hatched eggs feed on current year's foliage, causing it to shrivel and turn brown. Older larvae may feed on both current and old foliage, although current needles are preferred. Defoliation occurs first in the tops of the trees and the outermost portions of the branches, and then in the lower crown and farther back on the branches.

The adult male is a gray-brown to black-brown moth with feathery antennae and a wingspread of 1 to 1 1/4 inches. The forewings are gray brown and have two distinct, irregular dark bars and two vague whitish spots. The hindwings are a contrasting brown. The female has tiny rudimentary wings, small threadlike antennae, and a large abdomen. Young larvae are 1/8 to 1/4 inch long and have long, fine body hairs which later develop into tufts. Mature larvae are up to 1 1/4 inches long and very colorful. Two long, dark tufts or pencils of hair similar to horns are located right behind the head.

Four dense, buff colored tussocks are located forward along the middle of the back. The rest of the body except for the legs and head is covered with short hairs radiating from red, button like centers (Figure 3).



**Figure 3.** Douglas-fir tussock moth larvae (differences in color and size are due to stage of development).

The DFTM produces one generation each year. Females mate soon after they emerge from their pupal cocoon. Egg hatch in May or early June coincides with bud break and shoot elongation of the host trees. The larvae pass through four to six instars and pupate toward the end of the summer. The pupal stage lasts from 10-18 days depending on temperature.

Many natural controls exist that keep the number of DFTM low most of the time. If population levels are causing unacceptable resource damage, alternate methods of control are available. Silvicultural systems that reduce the number of susceptible hosts and decrease the multi-storied characteristics of host stands are recommended to prevent outbreaks. There is some indication

that fir growing in pine sites and fir stands located on warm, dry sites are most susceptible to damage.

The viral insecticide, TM-Biocontrol-1, is currently registered in California for use against DFTM. Other registered insecticides are also effective against DFTM including broad spectrum insecticides and more targeted growth regulators and microbial insecticides. Applications of insecticides are made aerially over large areas or with ground based equipment on individual trees. Where DFTM-caused defoliation is expected in high value areas, such as recreation areas or on individual high-value trees, pesticide use may be warranted to minimize tree mortality and reduce public exposure to caterpillar hairs that cause allergic reactions in some people.

### Public Health Concerns

The hairs on the caterpillars as well as their egg masses and cocoons may cause allergic reactions in some people. Itching is the most common complaint, but adverse health effects can include rashes (with welts or blisters), watery eyes, runny nose, cough and, less commonly, shortness of breath, wheezing, and chest tightness. Hot weather and perspiration increase the severity of symptoms, and people with a history of allergies may be more susceptible to “tussockosis.” Accidental disturbance or handling of old larval skins and spent cocoons, deposited under leaf litter, bark, wood piles, timber, or any other material that caterpillars have touched, can result in irritation. Irritation intensity depends upon the amount of contact with the caterpillar and the sensitivity of the person. The effects may be cumulative, with successive exposures resulting in elevated symptoms. In a 1998 outbreak at Grant Grove (located in Kings Canyon National Park), approximately 100 people sought medical attention or advice and facilities were closed for health and safety reasons.

Additional resources for DFTM information:

“White fir recovery following Douglas-fir tussock moth Bear Mountain outbreak” found at <http://caforestpestcouncil.org/resources/>

Forest Insect and Disease Leaflet 86: <http://www.na.fs.fed.us/spfo/pubs/fidls/tussock/fidl-tuss.htm>

## **Appendix B: Forest Health Contacts**

### **Region 5, Forest Health Protection, Service Area Contacts**

#### **Northern CA (National Forests: Klamath, Mendocino, Shasta-Trinity, Six Rivers)**

Plant Pathologist: Pete Angwin  
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